Lawrence Livermore National Laboratory

Monte Carlo Input Translators and Generator

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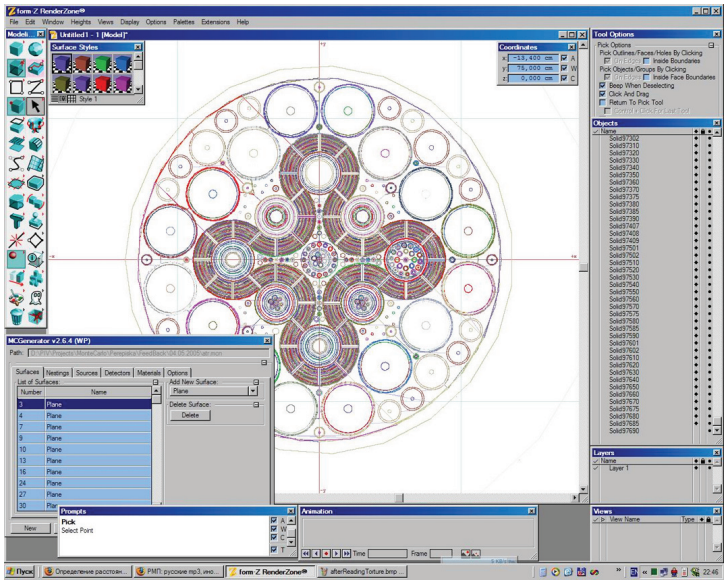
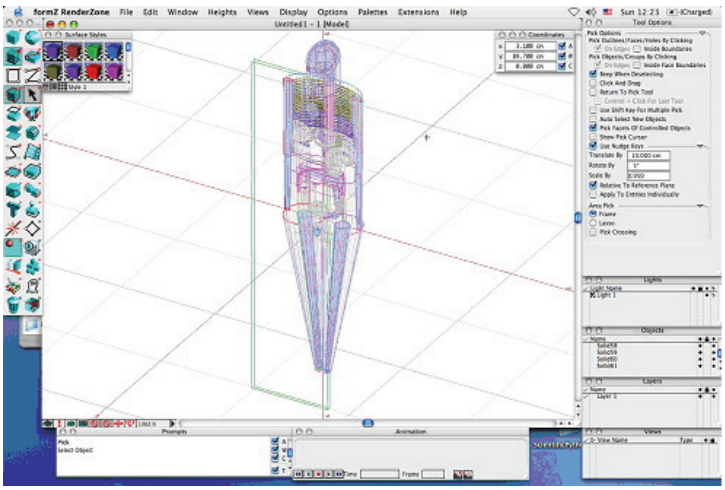
Project Description

The objective of this project is to develop plugins for three-dimensional modeling codes that read and write input file formats for three Monte Carlo radiation transport simulation codes: COG, TART, and MCNP. This represents the second stage of an effort to create a complete, unified generator (called MCGen) for the three transport codes. This stage focuses primarily on reading, writing, and translating the other input file definitions besides the geometry definition. The project delivers software in source code form.

The first stage of this project developed a minimal interface for the Windows and Macintosh converters using Python. A detailed analysis of the functionality of nested-space definitions in MCNP and COG was also performed, and unified format (UF) and conversions were implemented for UF ↔ COG and UF ↔ MCNP. The analysis and implementation of the process of conversion into TART geometry definitions were completed. The source definition syntax and semantics were analyzed for the three codes, and a unified format and conversions were implemented for UF ↔ COG, UF ↔ MCNP and UF ↔ TART. A set of Monte Carlo problem inputs with complex geometries was collected as a validation suite for the converter code.





The image on the top is from a FormZ model of a reactor system. The image on the bottom is a model of a radiation dose phantom.

Technical Purpose and Benefits

MCGen makes it possible to create faithful radiation transport models of very complicated objects far more quickly and reliably than has been possible previously. With the plugins developed in this project, these models can be developed using the powerful and sophisticated FormZ modeling interface and exported to a file that can be used as input to any of the major general purpose Monte Carlo radiation transport codes.

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